

10/520480

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
22 January 2004 (22.01.2004)

PCT

(10) International Publication Number
WO 2004/007777 A3

(51) International Patent Classification⁷: C21C 5/56, 5/30

(74) Agent: HERMAN DE GROOT, Johan, Willem; Corus Technology BV, P.O. Box 1000, NL-1970 CA IJmuiden (NL).

(21) International Application Number:
PCT/EP2003/007527

(22) International Filing Date: 10 July 2003 (10.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
02077780.1 10 July 2002 (10.07.2002) EP
02077781.9 10 July 2002 (10.07.2002) EP

(71) Applicant (for all designated States except US): CORUS TECHNOLOGY BV [NL/NL]; P.O. Box 10000, NL-1970 CA IJmuiden (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): DENYS, Mark, Bernard [NL/NL]; Gaaspstraat 44-1, NL-1079 VE Amsterdam (NL). MELJER, Hendrikus, Koenraad, Albertus [NL/NL]; De Waterdief 149, NL-1911 JR Uitgeest (NL).

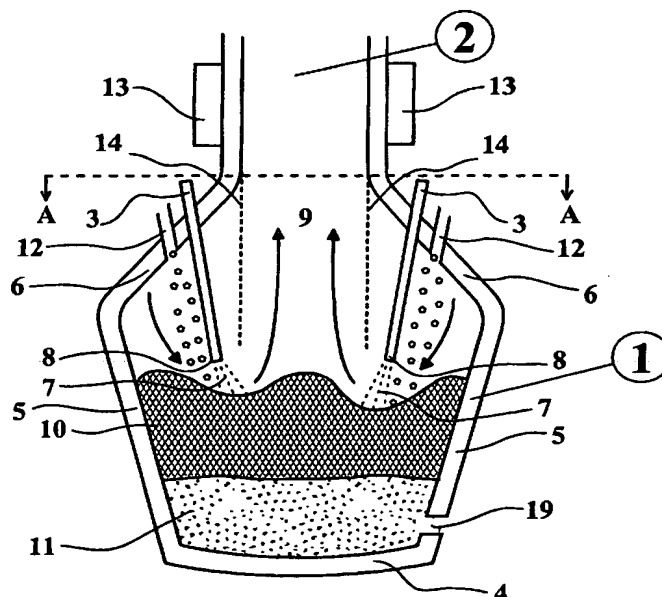
(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

[Continued on next page]

(54) Title: METALLURGICAL VESSEL AND METHOD OF IRON MAKING BY MEANS OF DIRECT REDUCTION



(57) Abstract: Metallurgical vessel for iron and steel making comprising a bottom portion, a sidewall and a lance arrangement of at least two lances for supplying oxygen containing gas to the interior of the vessel in operation wherein each lance comprises an end portion for emitting oxygen containing gas characterised in that the lance arrangement is configured so as to achieve in operation a substantially downwardly directed flow of post-combusted gases at the side wall of the vessel and a substantially upwardly directed flow of post-combusted gases in the center of the vessel.

WO 2004/007777 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:
22 April 2004

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/07527

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C21C5/56 C21C5/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C21C C21B F27B F27D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 195 985 A (BROTZMANN KARL) 1 April 1980 (1980-04-01)	1,3-8, 18,19, 21-23
Y	abstract column 1, line 5 - line 10 column 4, line 26 - line 45 column 6, line 48 - column 7, line 2 column 11, line 41 - line 68 claims 1,12; figure --- -/-	2

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *Z* document member of the same patent family

Date of the actual completion of the international search

17 February 2004

Date of mailing of the international search report

24/02/2004

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Ceulemans, J

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/07527

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 399 983 A (METZ PAUL) 23 August 1983 (1983-08-23)	1-3,7-9, 13,18, 19,21-23 20
A	abstract column 1, line 7 - line 9 column 1, line 55 -column 2, line 14 column 2, line 31 -column 3, line 3 column 3, line 16 - line 20 column 3, line 41 - line 52 claims 1,2; figure	
X	WO 00 22176 A (TECHNOLOGY RESOURCES PTY, LTD) 20 April 2000 (2000-04-20)	1,3-5, 7-10,13, 16-19, 21-23
	abstract page 1 page 1, line 6 - line 23 page 2, line 5 -page 3, line 10 page 6, line 1 - line 8 page 9, line 37 -page 10, line 17 page 11, line 21 -page 12, line 23 claims 1,5-9; figure 1	
X	EP 0 735 146 A (HOOGOVENS STAAL BV) 2 October 1996 (1996-10-02) cited in the application	1,3-12, 16-18, 21,22 13,14
A	abstract column 1, line 5 - line 12 column 2, line 22 - line 25 column 2, line 48 -column 3, line 18 column 3, line 39 - line 55 column 4, line 20 - line 45 claims 1,4,8-10; figures 2,3	
Y	US 5 681 526 A (ZHANG XIAODONG) 28 October 1997 (1997-10-28) abstract column 1, line 7 - line 16 column 2, line 17 - line 33 column 2, line 61 -column 3, line 56 claims 1,8,9,15; figures 1,3,6	2
A	EP 0 756 012 A (KAWASAKI STEEL CO) 29 January 1997 (1997-01-29) page 4, line 4 - line 10; figures 1-3	1-8
A	US 4 852 858 A (WEBER RALPH) 1 August 1989 (1989-08-01) column 4, line 12 - line 21	15,20

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/07527

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4195985	A	01-04-1980	DE 2755165 A1	26-07-1979
			DE 2838983 A1	20-03-1980
			AR 218949 A1	15-07-1980
			AT 377006 B	25-01-1985
			AT 874878 A	15-06-1984
			AU 530510 B2	21-07-1983
			AU 4237478 A	14-06-1979
			BE 872620 A1	30-03-1979
			BG 60214 B2	30-12-1993
			BR 7808087 A	07-08-1979
			CA 1123608 A1	18-05-1982
			CZ 7808115 A3	16-02-1994
			DD 140757 A5	26-03-1980
			ES 475778 A1	01-04-1979
			FR 2411239 A1	06-07-1979
			FR 2532327 A1	02-03-1984
			GB 2011477 A ,B	11-07-1979
			HU 182867 B	28-03-1984
			IN 149859 A1	15-05-1982
			IT 1107587 B	25-11-1985
			JP 57164908 A	09-10-1982
			JP 1320290 C	29-05-1986
			JP 54109016 A	27-08-1979
			JP 56008085 B	21-02-1981
			LU 80626 A1	09-04-1979
			MX 155005 A	19-01-1988
			NL 7812020 A ,C	12-06-1979
			PL 211603 A1	27-08-1979
			SE 444183 B	24-03-1986
			SE 7812613 A	11-06-1979
			SU 1306482 A3	23-04-1987
			ZA 7806885 A	28-11-1979
			CZ 8201448 A3	12-04-1995
US 4399983	A	23-08-1983	LU 82227 A1	30-10-1981
			AU 6802181 A	10-09-1981
			CA 1158443 A1	13-12-1983
			EP 0036382 A1	23-09-1981
			JP 56136912 A	26-10-1981
			ZA 8101303 A	31-03-1982
WO 0022176	A	20-04-2000	AU 1138100 A	01-05-2000
			WO 0022176 A1	20-04-2000
			CN 1323357 T	21-11-2001
			EP 1137815 A1	04-10-2001
			JP 2002527616 T	27-08-2002
			US 6440195 B1	27-08-2002
EP 0735146	A	02-10-1996	NL 9500600 A	01-11-1996
			AT 181369 T	15-07-1999
			AU 685021 B2	08-01-1998
			AU 5030996 A	10-10-1996
			BR 9601175 A	06-01-1998
			CA 2172898 A1	30-09-1996
			CN 1144275 A ,B	05-03-1997
			DE 69602871 D1	22-07-1999
			DE 69602871 T2	13-01-2000
			EP 0735146 A1	02-10-1996

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/07527

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0735146	A		ES 2135162 T3 PL 313551 A1 RU 2154110 C2 US 5662860 A ZA 9602540 A	16-10-1999 30-09-1996 10-08-2000 02-09-1997 02-10-1996
US 5681526	A	28-10-1997	NONE	
EP 0756012	A	29-01-1997	JP 3167888 B2 JP 9041018 A BR 9603163 A DE 69604542 D1 DE 69604542 T2 EP 0756012 A1 IN 187548 A1 KR 221350 B1 US 5769923 A ZA 9606280 A	21-05-2001 10-02-1997 05-05-1998 11-11-1999 13-04-2000 29-01-1997 18-05-2002 15-09-1999 23-06-1998 11-02-1997
US 4852858	A	01-08-1989	DE 3713369 A1 AT 63573 T AU 587933 B2 AU 1413188 A BR 8801884 A CA 1307396 C CN 88102184 A ,B DD 281241 A5 DE 3862803 D1 EP 0291701 A1 GR 3002106 T3 HU 47729 A2 IN 168550 A1 JP 1043805 B JP 1558873 C JP 63282207 A KR 9200350 B1 SU 1641195 A3 TR 23606 A ZA 8802622 A	10-11-1988 15-06-1991 31-08-1989 17-11-1988 22-11-1988 15-09-1992 23-11-1988 01-08-1990 20-06-1991 23-11-1988 30-12-1992 28-03-1989 20-04-1991 22-09-1989 16-05-1990 18-11-1988 11-01-1992 07-04-1991 30-04-1990 22-02-1989